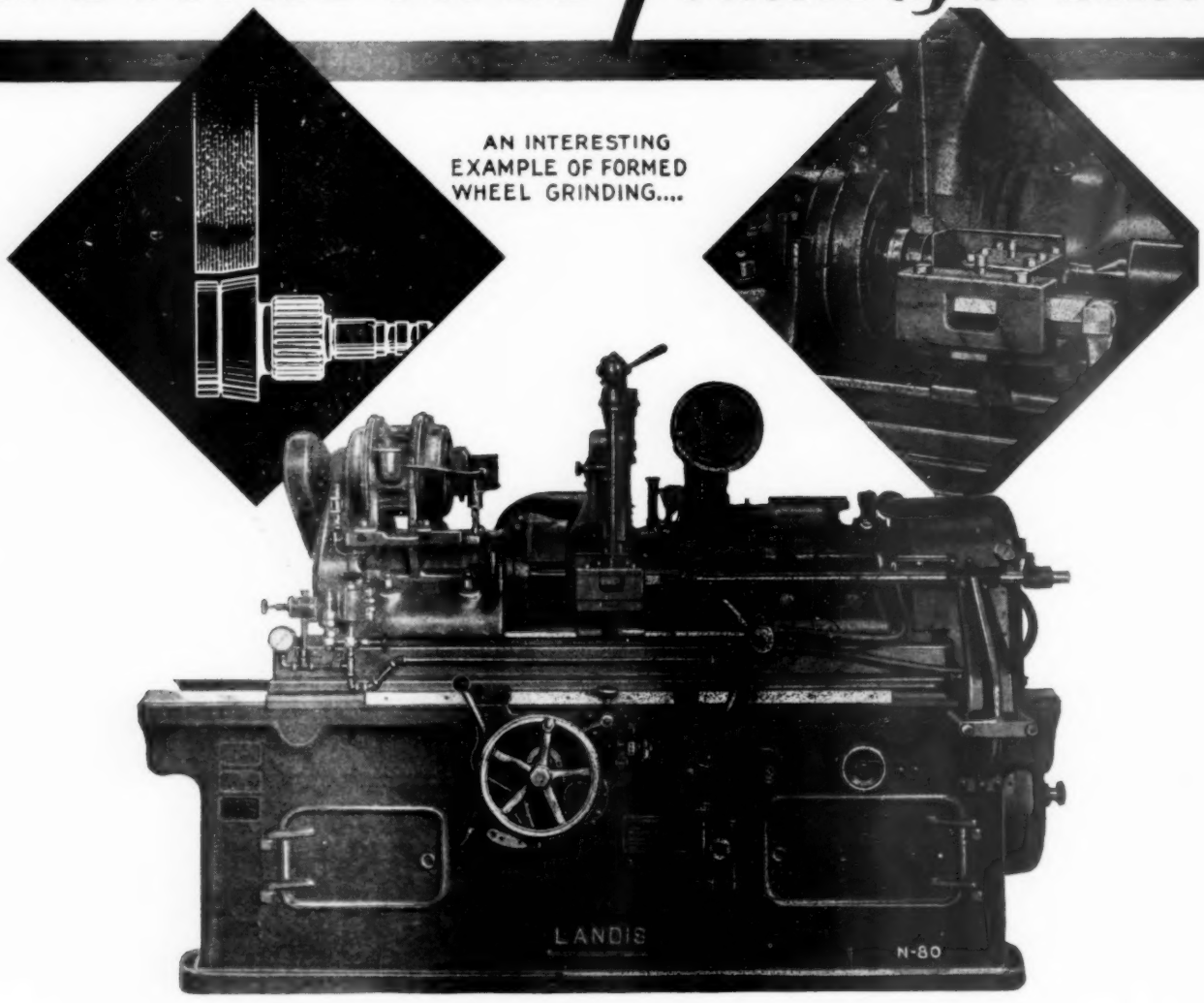
JOURNAL

JUNE 1932

Wm. J. McKEEN

GRINDING CLUTCH GEARS on a 10″ x 18″ TYPE B plain Hydraulic



IN the buying of motor cars never has the dollar been worth as much as it is today.

A part of this increased value is the result of decreased material costs. Lower overhead and more efficient distribution are factors. Above all, however, the accumulated savings resulting from the use of modern machine tools is stretching that dollar.

Modern Landis Hydraulic Grinding equipment contributes its bit. Machines like the one illustrated above have been grinding the straight and taper clutch portion of transmission clutch gears in a large automotive plant. Output per machine is 80 per hour roughing, removing .045″ stock or 80 per hour finishing, removing .010″ stock. Limits are .0005″ for runout; .001″ for size.

The operation is one of the plunge cut type, the face of the wheel being formed by means of a hydraulically operated profile truing fixture. Other features include a hydraulic straight infeed mechanism, an air operated footstock spindle and rather cleverly designed mechanisms for locating and driving.

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A. S. T. E. Journal

Published by the American Society of Tool Engineers

8316 Woodward Ave.
Detroit, Michigan

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Owing to the nature of the American Society of Tool Engineers organization, it cannot be responsible for statements appearing in the Journal either as advertisements or in papers presented at its meetings or the discussions of such papers printed herein.

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With sales lagging behind expectations, responsibility for survival of most manufacturing companies rests with its engineers and production men. They must find ways and means to make a profit, even on greatly reduced production schedules. And they are doing it.

One firm, by installing a specially built Garrison chuck, got required results and saved over $10,000 in equipment costs alone. Another cut grinding costs in half, improved accuracy, and lost only one gear through rejecting in six months. Still another cut tolerances for eccentricity in half without reducing production. There are scores of other examples, where Garrison chucks have improved accuracy and lowered costs.

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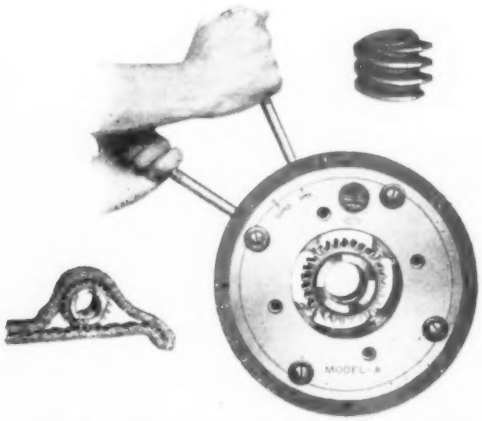

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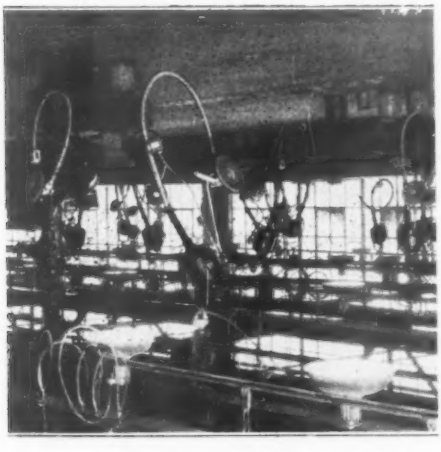

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MALL TOOL COMPANY

7740 So. Chicago Ave. Chicago, Illinois

MEMBERSHIP COMMITTEE

Seated, left: W. H. Smila, Tool Engineer at Chrysler's Jefferson Plant - Chairman.

Seated, right: Albert M. Sargent, President and General Manager of Pioneer Engineering & Manufacturing Co.

Standing, left to right: Frank H. Hartlep, Chief Tool Designer, Timken Detroit Axle Co.; Otto F. Poelke, Tool Engineer, Cadillac Motor Car Co.; A. S. Cumming, Die Engineer at the Packard Motor Car Co.

The membership committee has fixed its goal for 1932 at 1000 members. At the rate applications are coming in, it looks like they are traveling on schedule. Some grumbling has been heard from the directors because of having to stay so late at director's meetings voting on applications for membership, but we do not believe a little thing like that will stop the membership committee.

If you know of a tool engineer whose ability indicates that he is qualified for membership, give him the name and location of one of the members pictured above, and he will see that he gets the necessary information about the society and an application blank to fill out.

This Go-Gettin' Age.

"I don't see why you refuse to marry me because I asked you for just one kiss!"

"Well, any modern fellow who would ask for a kiss isn't aggressive enough to make a good living."

REPORT OF THE EMBLEM COMMITTEE

FRED L. HOFFMAN, Chairman

We feel that we have developed a button which is beautiful and individual in design. It represents no manufactured article, and therefore does not discriminate against any industy.

We have adopted a dark background (blue for senior and maroon for junior members) upon which is placed a golden sunburst, within which the white letters A.S.T.E. are placed.

The significance of the A.S.T.E. bursting forth in the sun is, that, as the sun bursts forth throwing its rays of light upon the earth, so also do the ideas of the Tool Engineer burst forth throwing their light and thought into the industries, revealing means of manufacture of better and cheaper products.

Orders for the buttons will be taken by a member of the committee at the next regular meeting at a price of $1.00 for the gold filled and $2.00 for the solid gold button. Orders will also be taken at any time at the office of the Secretary.

We want all members to have buttons as it will arouse an interest in the society and help build up the membership.

Sign of Prosperity.

An old gentleman down in Peoria, Illinois, wrote to Merle H. Thorpe, editor of "Nation's Business", that he could tell when the depression was over. He said that he had been through four panics and had found by experience that a panic ended just about the time he had worn out three pairs of pants. Writing to Thorpe, he said: "I know it is over because my third pair of pants is getting so thin now that when I sit upon a nickel in my hind pocket I can tell whether it's heads or tails."

* * *

Josie—"I see by the paper that the Marines have landed and have the situation well in hand. What's that mean?"

Mary—Geze, Josie, aint you never been out wid a Marine?"

NEXT MEETING

June 9, 1932 - 8:00 P. M. — Colonnade Room, Detroit Leland Hotel.

SPEAKERS:

LOUIS RUTHENBURG,

President—COPELAND PRODUCTS INC.,
Mt. Clemens, Michigan.

SUBJECT:

"The relation of the Tool Engineer to Management."

Mr. Ruthenburg has had a wide experience as an executive. Although his earliest training was technical, he was thrown into almost violent contact with men in a managerial capacity at the beginning of his career.

The most fortunate thing that ever happened in the business career of Copeland's president, he believes, was his association with Charles Kettering at Delco.

It would be difficult to work closely with a man like Mr. Kettering for 10 years—as Mr. Ruthenburg did—and not absorb some of his technique and adopt some of his habits.

From this association, Mr. Ruthenburg derived his habit of digging for facts, his habit of logical thought, and possibly some of his imaginative propensities.

He joined Copeland in 1929 as president and general manager. This brief history does not contain enough about him to properly describe his unquestioned ability to talk on the subject, "The relation of the Tool Engineer to Management."

FRANK W. CURTIS,

Research Engineer—KEARNEY & TRECKER CORP.,
Milwaukee, Wisconsin.

SUBJECT:

"What Tool Engineers should know about Tungsten Carbide."

Mr. Curtis will discuss some features of tool design used in connection with tungsten and tantulum carbides for milling, including the analysis of many operations now in use, showing the comparative production figures with former methods. Much will be said about the class of milling suited for TC application; also the materials that can be handled at this time.

The talk will deal with basic rules necessary for successful results.

In addition, care and maintenance suggestions will be offered. Very often, indirect savings are gained by the use of TC milling, and an outline of some of these will be discussed. Recent developments of tantulum carbide will likewise be discussed, and **the talk will be illustrated by motion pictures and lantern slides.**

Mr. Curtis will be glad to spend as much time after the formal talk in discussing the matter as you may desire.

LAST MEETING

Held May 12, 1932, at Webster Hall

Captain Woofter, Chief Engineer of the Swift Electric Welder Co., was the speaker at the May meeting of the American Society of Tool Engineers, held at Webster Hall, Detroit.

He sketched in a very interesting manner the development of tools as used by man in his steady climb throughout the ages, and brought out the fact that in each age the degree of civilization attained was dependent directly upon the kind of tools at man's disposal.

When man first began to use metals his only means of holding them together was by rivets of copper or bronze. This method was used up to the last few centuries, when he discovered accidentally that, if the partially melted ends of two bars of metal were forced together, they would continue to stick to one another after they cooled.

The first materials welded in this manner were lead and other soft metals, which melted at relatively low temperatures. Iron and very mild steel were next successfully welded. About 200 years ago the art of welding high carbon steel was discovered. In 1910 it was discovered that pieces of aluminum could be joined by welding.

In 1885 Professor Thomson, of Philadelphia, discovered accidentally the art of electric welding. He had constructed a crude transformer to demonstrate to a class of students how low voltage current in a primary coil could be used to induce a high voltage current in an adjacent secondary coil. Sparks were made to jump the gap between the ends of the wire in the secondary coil, in a manner similar to the way the electric spark spans the gap at the terminals of the spark plug used on gas engines.

He discovered that, if the electric battery were taken out of the primary coil and attached to the secondary coil, a low voltage and high amperage current was induced in the primary coil.

He attached a steel rod to each end of the primary coil, and attempted to cause a spark to jump from the end of one rod to the other. He gradually reduced the space between the two rods until the two ends of the rods touched; they were instantly heated and stuck together, and continued to stick after they were cold. Thus the electric welding process was discovered.

Space will not permit the covering of all the interesting applications described by the Captain. Fig. 1 illustrates

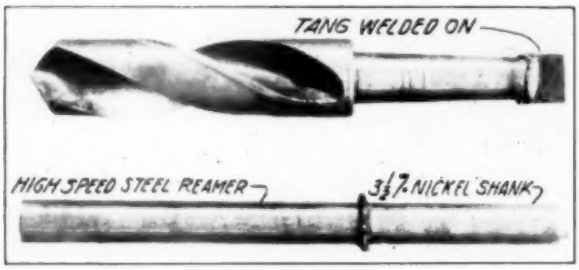


FIG. 1—**Application of Electric Welding to Perishable Tool Manufacture & Salvage.**

the welding of driving tangs, on large drill shanks which have been broken. Obviously this is much more economical than making a new drill complete.

The illustration below the drill in Fig. 1 is of a high speed steel reamer body welded to a torque-resisting nickel steel shank. Concentricity is maintained in such cases, and the shortening of the overall length is less than 1/32 inch.

It would seem that the Westinghouse air brake parts shown on the lower line in Fig. 2 could hardly be made by any other process than welding. Certainly, the welding together of the windshield tubes as shown in Fig. 2 effects an enormous saving in die cost.

The small welding machine in Fig. 3 is used to cut to length braided wire cable such as is used to operate the brakes of an automobile.

The difficulty encountered cutting such cables by the ordinary method of shearing is in the special precaution necessary to prevent the wire strands from uncoiling.

When the cable is severed on the welding machine, its various strands are welded together instantly as they are being cut, making it unnecessary to use a ferrule or any other method of overcoming the unwinding process. Incidentally, a head was formed on the ends of the cables, which were used on mechanical brakes, the head being formed after passing through the clevis.

FIG. 2—**Welding of Interest to the Machine Designer.**

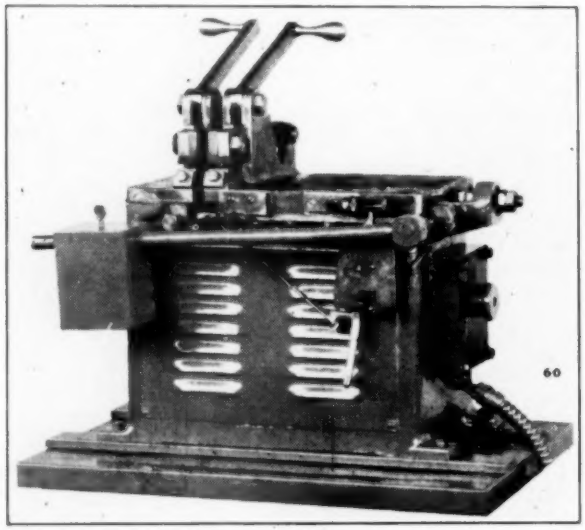
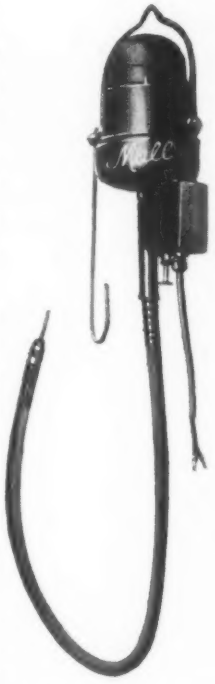


FIG. 3—**Swift Electric Coiled Cable Cutter and Welder.**

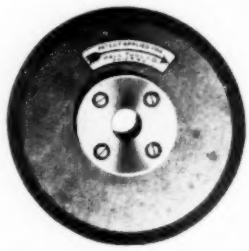
RECENT DEVELOPMENTS IN FINISHING EQUIPMENT FOR THE PAINT AND LACQUER DEPARTMENT



The Mall Tool Company of Chicago and Detroit announce several new improvements in flexible shaft equipments. New motor designs, improved shafts, and hand spindles that operate more smoothly and quietly are among the features of the latest equipment.

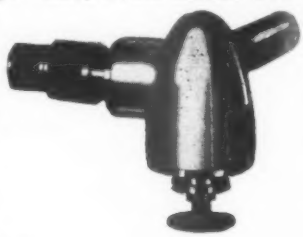
Outstanding of these is the new motor used for sanding and finishing operations of automobile bodies. Maximum production requires power, and with the new type motor which develops over 2 h. p. there is always power to spare at the operator's finger tips.

The motor is entirely enclosed in a vapor-proof housing, so that its operation is entirely safe in lacquer rooms, etc. The housing is constructed of aluminum so that heating is held down to the minimum. Cooling of the motor is arranged so that no draft is directed upon the operator, as is common practice in most vapor-proof vertical installations.



Illustrated is a typical unit with hanger bail assembly for overhead track mounting. These machines are also available in pedestal type mountings.

Mall shafts and hand spindles operate continuously cool. The patented practically continuous internal bearing shaft insures longer life, even under conditions requiring extreme flexibility. Smaller clearances between the shaft and shaft housing has decreased weight and size without any sacrifice in durability, thus adding to the operator's efficiency.



BE OF GOOD CHEER

George Washington had his Valley Forge, Napoleon his Waterloo, and the mighty Casey heard the third one called; but the glory of their illustrious careers shines on to flood our hearts with courage, to whistle in the face of overwhelming odds. Scenes of tragic failures are often birthplaces of high resolves.

After all, not everyone can, in one fell stroke, lose a projection camera; fail to provide an operator for it and a screen to receive the picture; lose a meeting place and chairs; and provide but one speaker when two were ordered. That's a mark of genius—a trait of distinction. The remarkable faculty of a meetings committee to provide an absolutely different type of entertainment indicates real tool engineering ability.

Our Society is supposed to be educational. We all learn by mistakes. Let us all thank the deep-thinking committee who provides such object lessons, and be of good cheer, for the committee is composed of tool engineers, whose only method of learning (according to the Boss) is by their own errors.

"And a good time was had by all", thanks to the meetings committee.

In their modesty they disclaim all rights to praise, maintaining that all these apparent slips were real and unforseen and absolutely beyond their control. Don't be misled. They are just three jumps ahead of us in their uncanny thinking. They used reverse English on us.

They aren't fired by the President—they are fired by a determination to make good. Let us give 'em our moral support.

Come to the next meeting. Be courageous; bring your friends. Give the committee a chance to show you. They will do it!

Last night I held a little hand
So dainty and so neat,
I thought my heart would surely burst
So wildly did it beat.
No other hand ne'er held so tight
Could greater gladness bring
Than the one I held last night which was
Four Aces and a King.

JULY MEETING

We are endeavoring to arrange with Honorable Frank P. Miller, President of the McCrosky Tool Corporation, Meadville, Pennsylvania, to come before our society in our July Meeting, if possible, with a message of vital importance to all tool engineers. The subject of his address will be, "THE TOOL ENGINEER IN THE NEW ERA".

Mr. Miller has come up from the ranks in the McCrosky organization and a few years ago was selected as their President. His experience has not been limited to manufacturing, for he is a man of broad experience, both educational and political. He has served his country as a Senator, and is now functioning as Chairman or Vice Chairman of the Board of Regents, of one or two colleges. He has been a Chautauqua platform speaker, and we feel that all those who do not hear Mr. Miller will miss hearing probably one of our most outstanding speakers of the year.

We therefore urge you to plan on keeping this date open and be sure to arrange to be on hand early.

EDITORIAL PAGE

THANKS FOR YOUR HELP

The members of the publicity committee wish to express their gratification for the way their initial effort, the publishing of the first copy of the A. S. T. E. **Journal**, has been received. We are particularly pleased with the support accorded us by our advertising clientele, who were quick to sense the real value of our paper as an advertising medium.

The confidence placed in us by our advertisers is due, in a large measure, to the knowledge that the American Society of Tool Engineers is a non-profit organization, and that this paper is issued without personal profit to any member of its staff. The charges for advertising will be only such as will be necessary to defray the expense incurred in publishing this journal.

That the advertising pages will be used by the members of the society for ready reference is naturally understood. Therefore, we will be greatly pleased if our readers will mention this paper in dealing with our patrons.

"MORE BLESSED TO GIVE—"

Men aren't born; they're made—and made by themselves—products of their own efforts or lack of effort. Their muscles become sinewy by exercise—their minds powerful through thinking.

The overcoming of obstacles gives them strength. Hardships are usually blessings in disguise. Most medicines are distasteful. Depressions give men greater strength. Lack of strength causes depressions. We emerge from depressions only after regaining the strength we lost during the boom. The longer the boom, the longer the double-chin, and the longer the period of exercise required to remove it.

All of which is apropos of the fact that we need to **work** to become more worth-while, to have strength to serve others—and serving others makes us stronger, so by serving others we really serve ourselves.

So,—For the sake of others and for your own sake, labor to produce an article of interest to be published in your **Journal.** Write a poem, draw a cartoon, send in a joke, an interesting shop kink, a new design of shop tool or die, a new method of manufacture, news of what other members of your Society are doing, and what you are doing. Make suggestions as to how you think we can improve the **Journal,** and the Society. Get up and "bust" right out talking at every opportunity at the meetings.

You can't really possess a thing unless you use it. This is **your** Society, your **Journal,** provided you use it to express yourself. That member who puts forth the greatest effort to make this Society and its voice, the **Journal,** of the greatest service to himself and his fellows, is the member who receives the greatest good. If we can each put in something of ourselves, our lives, this Society will be more powerful than one with forty times its membership, for in the average society only one man in forty contributes more then his dues.

The things that cost the most in this world are the things we get for nothing. You don't want to get your **Journal** for nothing, for it would then cost you the opportunity it presents of serving others and increasing your stature.

Mail, or bring, your contributions to Publicity Committee, 8203 Woodward Avenue. They will be published as space permits, under your name. Phone Madison 5048.

Two backwoodsmen in Maine knocked at the door of a house at the edge of the forest. "Hello, Syl," said one of them to the farmer who came to the door. "Say, we came across the dead body, of a man over there in the hollow, an' we thought 'twas you."

"That so? What'd he look like?" asked the farmer.

"Well, he was about your build—"

"Have on a gray flannel shirt?"

"Yep."

"Wes they knee boots or hip boots?"

"Lessee, which was they, Charlie, knee or hip boots? O yes, they was hip boots."

"Nope," replied Syl, going back into the house. "Nope, t'wan't me."

* * *

Little boy (awakening at 3 a. m.): "Mommy, tell me a fairy story."

Mother: "Hush, dear. Papa will be home any hour now, and he'll tell us both one.

* * *

Ole—"Aye vant to take this book from de library."

Librarian—"This, 'Ben Hur?"'

Ole—"Yah, dat bane she."

SHIM DIES

By GUY M. HARTSOCK,
Ass't Master Mechanic, Hudson Motor Car Company.

Due to the thinness of the material used, .002 to .015, the design of dies for the production of automotive bearing shims presents problems not encountered in heavier stampings.

Stock for the manufacture of shims is generally procured of correct width to produce the part and in reels of several hundred feet.

The extreme flexibility of the stock requires that the press be equipped with two sets of stock feeding rolls, one at either side of the die, as shown at A and B in Fig. 1.

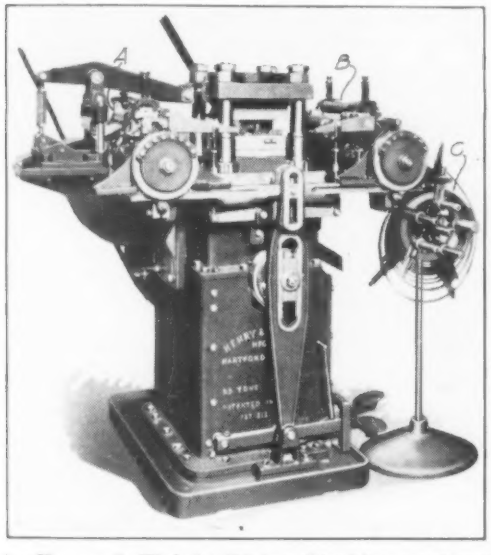


FIG. 1—**Henry & Wright Dieing Machine equipped with Feed Rolls, Stock Reel, and Scrap Cutter.**

The rolls are synchronized to feed the stock across the face of the die with no slack, and index one position with each stroke of the press. The stock is pulled by these rolls from the reeling mechanism C, at the right of the press, in line with the travel of the stock. The press shown in Fig. 1 is the type most commonly used for this class of work.

The theoretical clearance between the punch and die for cutting stock .002 thick is .0002, so it is readily seen that the first consideration in designing the die is to provide for the maintenance of perfect alignment of the cutting edges. This is accomplished partly by making the shoes of heavy vertical sections. The lower shoe A in Fig 2 is equipped with four hardened and ground guide pins B, accurately fitting the ground bronze bushings C in the upper shoe D. The clearance between the guide pins and bushings is held as close as will permit continuous running without seizing.

Bronze is recommended for the bushings, due to its ability to run satisfactorily with much less clearance than is possible with hardened and ground steel bushings.

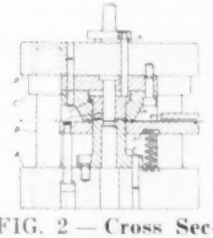


FIG. 2 — **Cross Section of Die in Closed Position.**

One pin and bushing should be slightly out of index with the other three to avoid the possibility of the upper and lower shoes being assembled incorrectly.

Generally speaking, compound dies, that is, dies in which the part is completed in one position and with one stroke of the press, are preferable to other types, and with few exceptions can be applied to flat shim manufacture. Fig. 2 illustrates a "compound" type die. Die H and punch I should be of the highest grade of non-shrinking die cutting steel obtainable and should be hardened to the proper specifications, and ground. The lower punch and die E should be made of a good grade of oil hardening tool steel. After oil hardening, it should be drawn so that it can be peened to resharpen its cutting edge. After its upper face has been increased in diameter by peening it is sheared in place by the hardened die H. In all cases, the hardened sections are the ones into which the shim enters, while the semi-soft sections are the ones over which the scrap stock is sheared. The reason for this is that the peening causes a slight burr to form on the stock which is forced down over the peened detail. Since the stock around the lower punch and die E is scrap, the burr is not permitted.

The strippers F and J may be made of mild steel. The lower one, F, is operated by the springs as shown. The upper one, J, is operated by the positive knockout on the press through the pins K.

The stock is guided across the face of the die by means of the channel cut in the steel plate G, which is screwed to the spring actuated stripper.

Inasmuch as shims are made in a continuous operation and at high speeds (approximately one stroke per second), the removal of the shim from the die is quite a problem. High pressure air is used in most cases for this purpose.

Fig. 3 illustrates the conventional method of removing the shim from the die by compressed air. A connection is made at L to the upper die shoe. A horizontally drilled hole leads from L to a point over the upper stripper, and a vertical hole from this point lines up with a hole through the upper stripper. The air stream coming from the lower face of the upper stripper tilts the shims as shown, so that the air stream from the jet at M can blow them to the right into a chute.

Both jets are opened simultaneously by an automatic valve operated by the ram of the press on its up stroke. They are closed on the last inch of the up stroke of the ram. The function of the upper jet is to break the vacuum between the shim and the face of the stripper, and to tilt it into the path of the cross jet which blows it into a receptacle alongside the press.

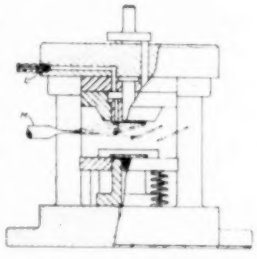


FIG. 3 — Cross Section of Die in Open Position.

CONE-TYPE FACE MILLING CUTTER WITH SERRATED BLADES

In a new design of cone-type face milling cutter recently announced by McCrosky Tool Corporation, Meadville, Pa., serrated blades are locked in the body by a hardened lifted wedge. The semi-circular shape of this wedge and its position in the body in relation to the blades, are shown in the accompanying illustration. The lifting wedge is brought into contact with the blade by a hollow headless set screw. This screw is not threaded into the body, but merely bears against the bottom of the wedge recess in the body. The screw forces the wedge up and over against the blade. This action in turn forces the serrations on the blade into rigid engagement with the serrations in the slot of the body. The wedge has a large contact surface, and being semi-circular it rocks to a perfect bearing against the blade. To release the grip of the wedge on the blades, it is only necessary to withdraw the screw a few turns and tap the wedge with a soft hammer.

The wedge and screw form a self-contained unit. The wedge is case-hardened to protect it from damage and to increase its length of service.

Behind each blade is another hollow headless set screw, which has a generous portion of its thread engaged by threads in the walls of the blade slot. This screw prevents the blade from being forced back however severe the cutting strain may be, and it also provides an easy method of adjusting the blades forward uniformly for regrinding.

The blades are set in the body at a steep angle in relation to the center line of cutter. The serrations on the blades are horizontal and parallel to the bottom. Moving the blades forward a very short distance produces a liberal radial expansion. Ample length of blade affords generous end movement for adjusting the cutters radially without changing the engagement of the serrations. Additional radial adjustments can be secured by stepping the blades out one serration. This can be repeated for several serrations without sacrificing rigid locking of the blades in the body. As a result 70% of the blades can be worn away in actual use before the cutter has to be fitted with a new set of blades.

The cutter body is made from a high grade alloy steel, and is case-hardened to prevent damage by chips or hard usage. Standard blades are made of high speed steel. Blades can also be furnished of Stellite, or tipped with hard carbide metal. Standard sizes of this cone-type face milling cutters for medium duty service range from 5 to 20 inches in diameter.

Special cutters with fewer blades and cutters with heavy-duty blades can be furnished to specifications.

The poor we have always with us; the rich can commit suicide.

* * *

Taxi Driver—"Here you are, sir. This is your house. Be careful, sir—here's the step."

Stew:—"Yesh, Thash allri, but where ish the wresh of my feet?"

DID YOU KNOW

—that a pull broach for round holes and the like, if left lying down on a metal bench, window sill, etc., for a few days, will run when next used and must be sharpened again to prevent running?

Always stand broaches up in a suitable rack.

* * *

—that .001 lead error per inch on a screw thread affects the fit of the thread the same as .0017 increase in pitch diameter in one inch length of engagement?

* * *

—that clearance must be provided in the truncated triangles at crest and root of tapped holes if tight studs are to be driven successfully?

The man who runs the machine is often closer to the job than the tool engineer.

* * *

—that frozen carbon dioxide, or so-called "dry ice," is being used successfully to shrink bushings, collars, etc., before pressing them into other machine parts, thus minimizing the chances of cocking or shearing.

* * *

—that to quickly find the approximate weight of a round steel bar one foot long, square the number of one quarter of the inches in the diameter and divide by six.

Example—What is the weight per foot of a 2 inch diam. bar 2″—8/4 8x8 : 6—64 : 6—10.666 lb. per foot.

YES, YES, PARDON? OH! YES, O.K. SURE, UM HUM, YEAH, ALRIGHT, ABSOLUTELY RIGHT AWAY, I WILL, (ETC. ALSO VARIOUS OTHER FORMS OF THE AFFIRMATIVE)
MUSTA FORGOTTEN TO WASH THE DISHES
CR SUMP'N

THE ORDER TAKER

Scene enacted at a recent meeting of the Publicity Committee. Time—approaching midnight.

"Somewhere a voice is calling."—Guess who it is.

Observations by Toolsmith

To Doc Bachem, professor of bio-physics, we must feel grateful for the following information, "Mass production does not satisfy our BIOLOGICAL requirements".

That's clear as a bell.

But at the same time one ought to call the attention of the learned man to the fact, that, in the same proportion that we lost our gills and webfeet, we obtained something: by name, **INTELLIGENCE.**

It is **THAT** that has necessitated mass production.

—o—

Now there is Uncle Ghandi, the saint of India —in his holy zeal to return to "fundamentals", he packs around with a spinning wheel.

Wonder if he realizes that just that little gadget is the very model of the spinning machine.

The Mahatma must go much farther back to even touch "fundamentals".

But the holy man is all wet: why fight the results when he should fight the cause—human ambition.

That is a SOCIAL question; namely, to regulate and lead human ambitions in the right channels.

But perhaps he has seen his error by now—they do say he has taken to the sewing machine, one of the most nearly perfect implements of our time.

Those Hindus are odd.

—o—

Will we ever forget this muddle, these awful days we are passing through?

Now everybody unanimously says, "NO!—Never! Never!"

Ten years after the guillotine choked the gutters of Paris with human blood—Paris danced as gay as ever.

But of course we are not Frenchmen.

J. B. G.

The Old Oil.

Judge—"The jury finds you guilty."

Prisoner—"That's all right, judge. I know you're too intelligent to be influenced by what they say."

* * *

Al—"I see where you are putting up a new building."

Cal—"Yeah, we put up only new buildings."

DIES AND TOOLS IN BUILDING BRIGGS BODIES

By V. J. GRAF

Chief Die and Tool Engineer

(CONTINUED FROM MAY JOURNAL)

An all-steel body may have from four-hundred to six-hundred various dies necessary for its manufacture, subject, of course, to its construction. As to price, one might say these dies range from $100 to $12,000 for one single die, a fair average being questionable. Why? Because there have never been two body designs alike. This makes the profession interesting, though costly, but it is necessary. Stop the design of new bodies, and old styles, with the resultant lack of public interest, will stop progress. We would all shudder to think of adopting one standard for Milady's styles in apparel. Imagine the seasonal cost, however, which may not necessarily mean progress but a whale of a lot of business.

Mechanism

In the family of blanking dies, one of the simplest types is a Combination Blank and Pierce Die, as is shown in Figure 1. It is constructed of cast iron and of various grades of steel. Its parts (see letters, Figure 1) are as follows:

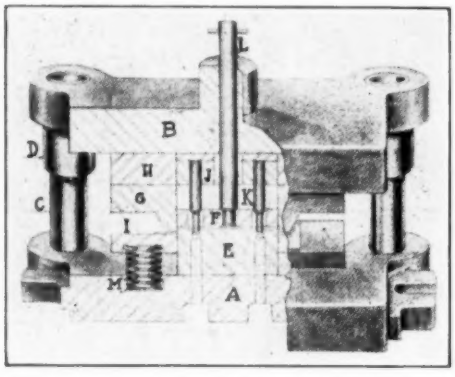


FIG. 1—Blank & Pierce Die.

A. Die shoe or base casting.

B. Punch holder casting.
These two parts are bases on which the die is constructed. For the smaller dies they are known better as Die Sets.

C. Guide pin.

G. Guide pin bushing.
This keeps the die in accurate alignment. (Their installation is 100 per cent on all dies.)

E. Male cutting steel.

G. Female cutting steels.
These two details actually perform the cutting of the blank.

I. Spring stripper pad.

M. Spring.
Strips the flash off of male cutting steel, the flash becoming scrap.

F. Positive stripper.

L. Positive stripper knockout pin.
The positive stripper actuates by the revolution of the press and positively releases the completed blank from die.

J. Punch holder.

K. Piercing punch.
These details perform the piercing.

Types of Dies

As a doctor talks medical terms, die and tool men and manufacturers have a language of their own. There are any number of standard names used for dies. Of them all, the simplest is the blanking die, termed "blank", as it merely cuts out the desired blank from a sheet of steel. Such a die we have just discussed.

There are many types of dies. However, departing from concrete names is necessary in body die work to identify the die by its actual operation, or operations, which it performs. Hence, each die has a name or title, which, compared with the part, gives the Production Department an exact picture of its function. For instance, dies may be designated as: Blanking, piercing, flanging, forming, curling, upsetting, trimming, etc., or any combination.

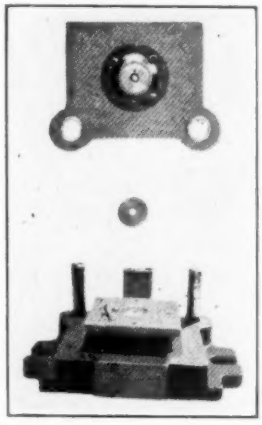


FIG. 2 — Die for Part shown in center of fig.

Space will not permit going into detail to illustrate some of our complicated dies which weigh tons and perform several combined forming operations requiring tons of press pressure to operate. Figures 2, 3, and 4 will give the reader an idea of the range in size and complication of the dies designed and constructed at the Waterloo Plant of Briggs Manufacturing Co.

Template Department

A template is a piece of sheet steel shaped so that it may serve as a guide in making an article with a corresponding contour.

To perform this work a department, maintaing a force of template makers, is necessary. The die maker, if not having the advantage of a template,

would be handicapped, as it would be necessary for him to layout his own work over and over again, depending upon the number of dies necessary to produce a part. This would cause much inaccuracy, loss of time, and "grief." The Template Department is held responsible in almost 90% of the cases for the accuracy of a die; a wrong template will unquestionably show up in the completed die as an error.

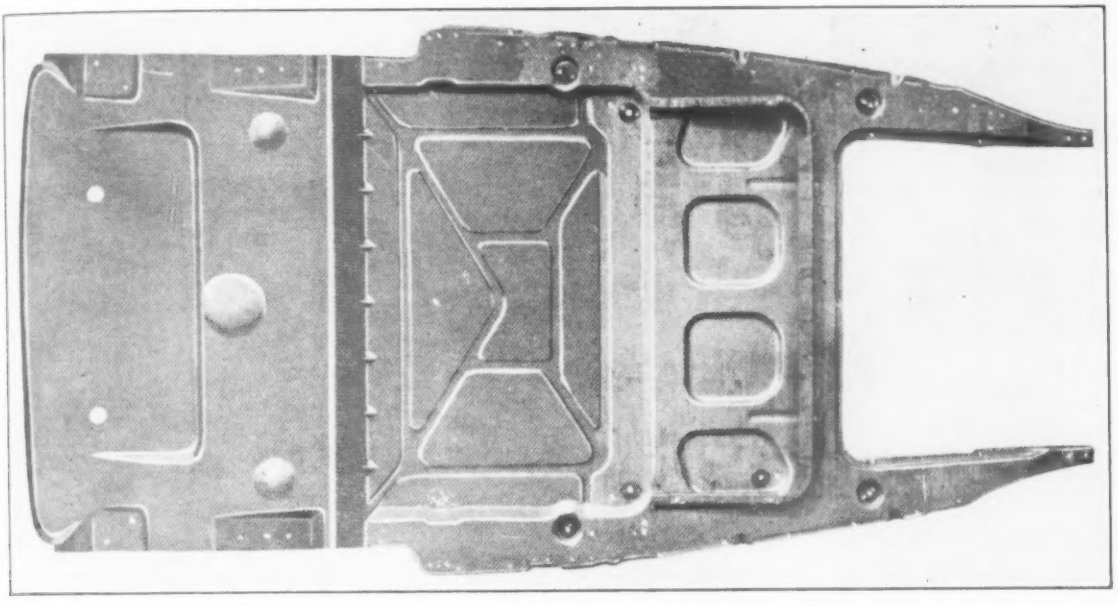


FIG. 3—Chrysler Underbody.

Dies of all types and sizes are required for stampings on Briggs Bodies.

Figure 2 shows one of the smallest and simplest dies we build, a Blank and Pierce Die, which stamps out washers (as shown in center of Fig. 2) at the rate of 1000 per hour. Fig. 3 shows the all-steel Chrysler Underbody, practically the largest single part produced by dies at Briggs. In Fig. 4 is shown (greatly reduced in size) one of the dies used in fabricating the Underbody shown in Fig. 3.

It is the Punch of the Cam Die, one of our giant dies, weighing approximately 13 tons and requiring a No. 15 Bliss Press with a press tonnage of 1700 tons to operate it. This is practically the largest die Briggs builds—a complicated tool which pierces 333 holes with one stroke of the press.

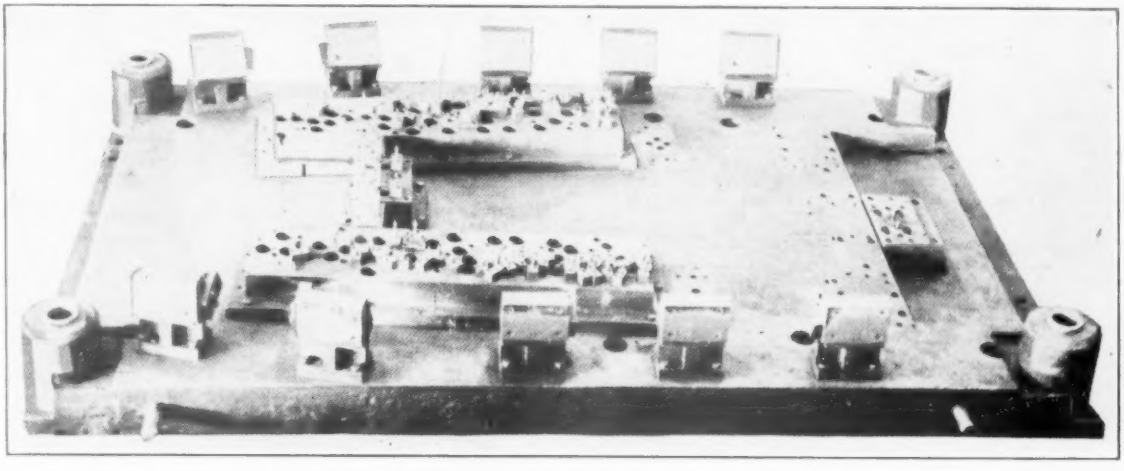


FIG. 4—13-Ton Die Shoe for Pielcing 333 Holes in Chrysler Underbody. Used on 1700 Ton Bliss Press.

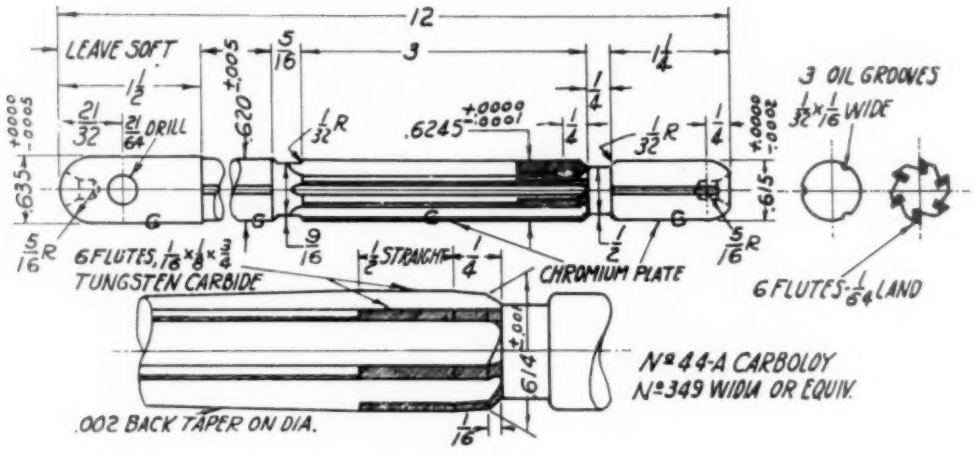
Template Making

The making of a template is by no means simple. We might say it is drafting on steel, as the desired curve trim line, blank development, flange, offset line, or layout of a series of holes are taken from the part print, and laid out on steel very accurately. After layout, it is cut out and filed within a few thousandths limits. The template, after being checked, is properly stamped to identify it as belonging to a particular die of a part, then released to the Tool Room. Figure 2 shows a very simple template—in this case also the blank—which would be used by the die maker in working out the blank in the typical die represented in Figure 1.

Fixture Templates

Flat templates are not solely used. They hold the majority. At times, however, as is the case

(Continued on Page 20)



CAN YOU BEAT THIS ?

By EDWARD C. LEE,
Chief Tool Designer, Chrysler Corporation.

Due to the close limit of the valve tappet holes in cyl. block, .624 plus .0005 minus .000, high speed steel finishing reamers would only produce 1200 holes before they were worn undersize. A tungsten carbide tipped reamer was tried out and produced 72000 holes within the limit.

The only difficulty was that the reamer body had worn down directly behind the tungsten carbide tips.

A new reamer was made and the body was chromium plated. This reamer has up to the present time produced over 1600,000 holes and is still on the job.

ANNOUNCEMENTS

Mr. W. J. Fors, treasurer of the A. S. T. E., is now associated with the Gray Hub Co., 17265 Gable St., Detroit, Mich., in the capacity of Sales Engineer. The Gray Hub Co. specialize in tool and fixture work, and in addition they manufacture a line of drill heads.

* * *

At the last Director's Meeting of the American Society of Tool Engineers, held May 19, 1932, a large of number of applications for membership were voted on. The Directors authorized the membership committee to provide membership cards to be issued to all members. The Directors ruled that the Chairman of all committees must get accounts authorized by the Finance Committee before contracting any expense in connection with the activities of their committees.

The Publicity Committee was authorized to proceed with the June issue of the Journal, 750 copies being required.

* * *

October 3-8—Fourteenth annual National Metal Exposition, to be held in the 174th Regiment Armory, Buffalo, N. Y. W. H. Eisenman, secretary, American Society for Steel Treating, 7016 Euclid Ave., Cleveland, Ohio.

* * *

The following petition, authorized by the American Society of Tool Engineers, has been forwarded to State Senators James Couzens and A. H. Vandenberg.

"The undersigned earnestly oppose passage by Congress of a bill singling out automotive products for taxation. We urge that instead some form of general tax be used to raise the necessary revenue, and that automotive levies be completely removed from the tax bill. We ask you to vote against automotive taxes and use your influence to prevent their imposition."

* * *

Babcock & Wilcox Tube Co., Beaver Falls, Pa., has opened a new branch office in the Ford Bldg., Detroit, Mich. J. E. Polhemus has been appointed district sales manager in charge of the Detroit territory.

* * *

June 12-17—Spring meeting of the Society of Automotive Engineers, at White Sulphur Springs, W. Va. John A. C. Warner, secretary, 29 W. 39th Street, New York City.

STRENGTH OF MATERIALS

J. M. CHRISTMAN
P. F. ROSSMANN

II.

In the last text, the reciprocal of the "Modulus of Elasticity" was defined as being the amount any substance 1" long with a cross section of 1 sq. inch will compress or stretch when subjected to a load of 1 pound. Fig. 1 and 2 illustrate the definition as applied to steel. In Fig. 2 it is to be understood that the load is distributed evenly on surfaces X and Y.

Knowing that the reciprocal of the "Modulus of Elasticity" is the amount of compression or extension when all conditions are unity, and with a slight knowledge of proportion, it is quite easy to solve problems involving any other conditions. However, for those that prefer, the essential elements of the computations are expressed as follows:—

A—Cross Section in square inches
B—Length in inches
C—Load in pounds
D—Modulus of Elasticity
E—Compression or extension in inches

$$E = \frac{B \times C}{A \times D}$$

The "Modulus of Elasticity" and its reciprocal for Steel and Cast Iron are indicated in the following table:

$$\frac{1}{\text{Modulus of Elasticity}} = \text{Reciprocal}$$

MATERIAL	MODULUS OF ELASTICITY	RECIPROCAL
STEEL	29,000,000	.000000034
CAST IRON	12,000,000	.000000083

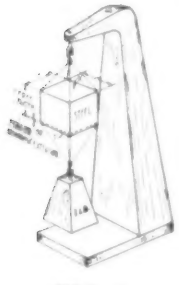


FIG. 1

PROBLEMS—No. 1—

a—How much will a steel bar 12 inches long with a cross-section of 1 square inch stretch when subjected to a pull of 1 pound?

b—When the pull is 1500 pounds?

c—When the cross-section is 8 sq. inches and the pull 4500 pounds?

a—$12 \times \frac{1}{29,000,000}$ or 12x.000000034 = .0000004°8 In.

b—$12 \times \frac{1}{29,000,000} \times 1500$ or 12x.000000034x1500 = .000612 In.

c—$12 \times \frac{1}{29,000,000} \times 4500 : 8$ or 12x.000000034x4500 : 8 = .0002295 In.

No. 2—A Cast Iron Bar is 12 feet long and has a cross-section of 6 square inches and is subjected to a pull of 60,000 pounds. How much will it stretch?

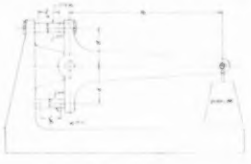


FIG. 2

SOLUTION—$12 \times 12 \times \frac{1}{12,000,000} \times 60,000 : 6$ or 12x12 x.000000083x60,000 : 6 = .120 In.

No. 3—What cross section should a cast iron beam 20 inches long have so that it will not compress more than .0005 when supporting a load of 3 tons.

SOLUTION—$20 \times \frac{1}{12,000,000} \times 3 \times 2000 : .0005$ or 20x 000000083x3x2000 : .0005 = 20 Sq. In.

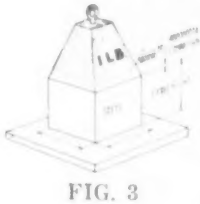


FIG. 3

No. 4—In Fig. 3 a weight of 1000 pounds is applied at the end of the beam. How much will length "A" stretch and length "B" compress, neglecting any change in the supporting structure or beam?

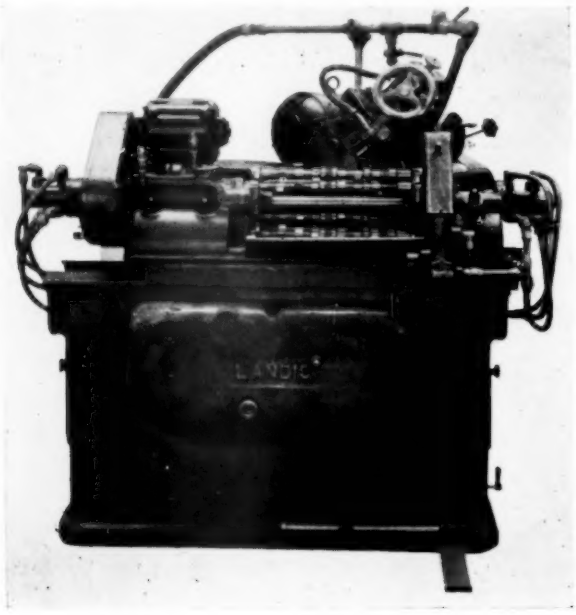
—The solution to this problem will appear in the July issue.

ANNOUNCEMENTS

The wire industry will have an important share in the 1932 National Metal Congress and Exposition in Buffalo, October 3 to 8. The Wire Association, of which John Mordica, Bethlehem Steel Co., is president, will have a series of meetings during the Congress, and a number of manufacturers of wire and wire drawing equipment have reserved space at the exposition, which will be held in the 174th Regiment Armory. Reservations have already been made for almost one-half the available 50,000 square feet of exhibition space.

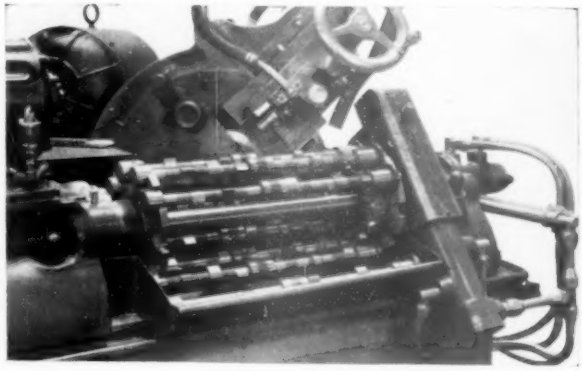
Polish Grinding the Underside of Camshaft Flanges on Landis Type C Semi-Automatic Hydraulic Grinaer

The new Landis Type C Plain Machine with nothing but standard equipment may be used quite efficiently for a larger number of grinding operations than might be realized. Of great importance also, especially to the automotive manufacturer, is the fact that the entire design makes it quite practical to equip the machine with all sorts of special fixtures and attachments for single purpose high production work. A very interesting application of this kind is shown herewith. The operation is polish grinding the underside of a camshaft flange on a full semi-automatic basis.



The wheel base is set at an angle, the face of the wheel being trued V shaped, in order that the front cutting edge will be well supported. Only the minimum number of operations are manual; the remaining are automatic. All the operator does is keep the work turret loaded and depress the foot pedal at the front of the machine. Assuming that a flange has just been polish ground, the foot pedal is depressed with the following operations taking place.

To begin with, the wheel moves away rapidly to its starting position. Then the work rotation stops, the work holding collet releases and withdraws into the head, the footstock center withdraws, and finally the turret indexes, bringing the next camshaft into polishing position. As soon as this takes place the foot pedal automatically unlatches, causing the footstock center to advance, the work holding collet to advance and grip the work, the wheel base to move forward, and the work rotation to again start. The indexing turret carries the finished shaft around to the front of the table where it is deposited, thereby enabling the operator to transfer it easily to the conveying system.



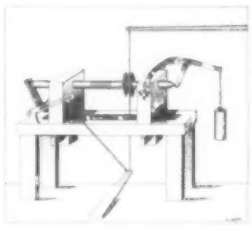
Although so many of the machine movements are automatic, they are smooth, quiet and well coordinated because of the skillful application of hydraulic power. This actuates the wheel base, the work holding collet, footstock center, work indexing turret, and even the diamond holder. The hydraulic hook up and the electrical arrangement are such that it would be impossible for any of the movements to take place out of order, and in this manner probably damage the machine.

Should there be any great amount of stock removal necessary, exactly the same equipment would be used to grind instead of polish grind. The only difference would be in the selection of the grinding wheel. Similar arrangements might be used for polish grinding or grinding other automotive parts. However, there are many other special attachments and devices applicable to these new Type C machines for work of a vastly different nature.

THE ANCESTOR OF THE SCREW CUTTING LATHE

Ask your tool maker if he can cut threads on a machine like this. It used to be done.

SCREW CUTTING LATHE
Designed by
M. GRANDJEAN
—1729—
French Academy of Science.
Copied from American
Machinist Magazine
April 1920.



The tool was not shown, but may either have been a hand tool with a stop to help hold it in position, or some device clamped to the bed. At any rate, the first cut would be no easy task for the operator.

A. S. T. E. and Standardization

The standardization of any subject or article in any field is synonymous with unification and simplification of practice, and obviously becomes a natural function of any engineering body.

The A. S. T. E., with its very purpose of organization and a membership comprising specialists in tool engineering, makes it most fittingly qualified to enter this field of endeavor.

We should seek the cooperation of the various engineering societies and institutes who have pioneered standardization work in this country, and, probably, before our venturing into the subject very deeply, we could wisely confer with such organizations as the A. S. M. E., the S. A. E., the National Machine Tool Builders' Association, and the American Standards Association, ascertaining those subjects already standardized or approved by them and receiving from them the recommendation of sponsoring some subject appropriate to our society; also in case there be any tool subjects that have been standardized but not universally used, we could occasion the matter to be studied, and if, in our judgment, their use would prove beneficial, we would recommend its application to industry. Subjects must not be picked at random, but should be very carefully selected, after which, procedure should be made with precaution, always considering the resultant economic value, simplicity of construction, and its possibilities of universal acceptance and application.

Co-ordination between the manufacturer and user is a pre-requisite for standardization, the sponsor body acting as the go between or middleman. Consideration of stocking is also an essential factor, as the manufacturer and user should be given an opportunity to deplete their stock of the replaced article before the new standard becomes effective.

J. A. SIEGEL.

OBITUARY

The society announces with regret the death of charter member Mr. H. T. Martin. Mr. Martin was born Jan. 30, 1894, at New London, Conn. He had a wide knowledge of tool and machine design and manufacture, and was at one time technical officer of the Gage Design Section of the Ordinance Department of the U. S. Army. He was recently connected with the Tungsten Widia Tool Corp., 10-220 General Motors Building, in the capacity of District Manager.

JUNIORS

This issue of the Journal is dressed in the colrs of the junior members of the A. S. T. E., most of whom are students at the Detroit College of Applied Science. We should like to see students brought into the society from other educational institutions where tool engineering is being taught. You junior members should get busy and increase your membership, and start some real junior activity. We should like to suggest that a committee be appointed to take charge of junior activities to procure special speakers for special junior meetings, in which the juniors can participate. Every senior member will gladly cooperate and give you every assistance possible.

You senior members should be interested in knowing just what these students are being taught, and how they are being trained to step in to help you, and eventually take your places.

It will give you some idea of the competition you are going to meet with in the future, and may give you some incentive to keep up on what is going on around you in the tool engineering field.

The tool engineering training received by these students is about as follows:

The first unit consists of a thorough practical training in Mechanical Drafting, including machine drafting and Applied Industrial Mathematics through Trigonometry. This qualifies the student to make complete assembly and detail working drawings.

The second unit consists of Tool Designing, Applied Mechanics and Strength of Materials, Elements of Machine Design and instruction in the use of Slide Rule, also lecturers, with blackboard illustrations and suitable texts, on modern machine shop practice.

The third unit is Die Designing, advanced lectures on modern production Methods, and sheet metal operation layout. The student is required to design, from part prints, practically every type of die from the smallest simple blanking and piercing die, to the larger dies used in the automobile body plants.

The fourth unit puts the student in the position of the Tool Engineer. He is given a machine, such as a drill press, and is instructed to put it into production, on the basis of a specified number

of them being completed daily for a given period of time. He is required to take each separate part and make out operation sheets specifying each operation in its proper sequence. He must select the machines and sketch each tool, jig and fixture, or die to completely produce the part.

He must figure the cost of materials, machines, tools, and labor to completely produce the entire machine, including the final assembly, and determine the complete manufacturing cost of the article being produced. He must make up his plant layout seeing that every machine is so placed that there will be no time lost in maintaining an even production schedule of a given number of units per day or month, and specify necessary material handling devices. In selecting the machines, he is required to get proposals from manufacturers, and must weigh one type of machine against another and base his decision on, not only the initial cost, but floor space occupied, horsepower required to operate, interest on capital investment, labor cost, rate of production, and quality of output.

In normal times most of the students in the evening classes are Draftsmen, Tool Designers, Tool Makers, Die Makers, Machine Operators and Production Men. Their average age is around 28 years. At the present time this type of man is attending day classes, owing to the unemployment situation. In normal times most of the day students are young men just out of high school.

Seniors! these are the men who are going to be out after your jobs when things begin to hum again. It is up to you to look to your laurels, for these young, aggressive fellows are going to go places, and be heard from. More power to 'em; and to you too. It is going to be a merry fight. May the best man win!

The Publishing Committee.

Reducing the Fare.

Conductor: "Madam, you will have to pay for this boy."

Madam: "But he's only 10."

Conductor: "Well, our rule is 'Long pants, full fare; short pants, half fare.'"

Colored Mammy (in rear seat)—"Lawsee, next time Ahse gowan ride fo' nothin'!"

* * *

Suburban Heights.

"Life's a queer business," soliloquized the suburbanite, as he ran for the 8:07. "Either I'm standing on the platform when the train puffs in, or I puff in while the trains is standing at the platform."

Dies and Tools in Building Briggs Bodies

(Continued from Page 15)

with outer panels on an automobile, the contours are so variable, that flat templates result in complications. A fixture is then made, constructed of a wood framework strongly supported and reinforced so that it will not lose its shape. This is spotted perfectly to the model, where all desired lines, such as beads, offsets, reveals, holes, etc., are wanted. The wood frame is lined with steel, and laid out and filed as in the case of a flat template, the result being a working fixture closely allied with a model. Its practicability is beyond question.

Pattern Department

Wood patterns are made for all dies requiring a casting or castings. The pattern is built from die drawings, and is exact in shape as required after cast of iron or steel. A die may require from two to ten patterns to complete. The patterns are released to outside source foundries to use for molding purposes, then cast. Patterns are cast in various materials, depending on material necessary in the construction of dies as called for on die drawings. The commonest of materials used are cast iron, cast steel, cast tool steel, and bronze.

While pattern making is one of the oldest mechanical trades, body die pattern making is young, requiring experienced, mechanically trained men who can work in wood with imagination.

When the patterns are completed, they are sent to the foundry. There, in the hands of moulders and foundrymen, our patterns are used in the process of making die castings for Briggs dies.

The outside company sends the rough castings to Waterloo Plant. After careful check to our specifications, the casting is placed on the planer, where it is made ready for the Die Layout men, who start it on its way to be built into the die conceived by the designer.

LAYMAN: — What is that ASTE button you wear.

MEMBER: — I am glad you (ASTE) asked me, it represents The American Society of Tool Engineers.

F. L. H.

PLANNING SHEET METAL OPERATIONS

By CHARLES W. BALLE.

Chief Engineer, Clayton & Lambert Mfg. Co., Detroit, Mich.

Mistakes are often times made in the planning and designing departments which are costly to rectify in the shop.

When planning sequence of operations, be sure the succeeding operations will produce the part to specifications, also consider the tonnage required. Crankshafts do break from time to time, caused principally from overloading your press.

Holes in flanges of straight breaks, bends, or forms, can be pierced in the blank.

Holes of importance in parts which are drawn must be pierced afterward.

Will the completed die fit in the press? Occasionally, the standard throw of the crankshaft has been changed to increase the stroke of the ram, and, if your die requires the maximum shut height, your are in serious difficulties, especially if the shop is equipped for a progressive line up of operations.

Is the part to be made of scrap? If so, are the guide or leader pins in the proper position for clearance?

Provide proper heeling on forming and draw dies, also on cut-off dies.

Trim and pierce dies:—Trim sections on upward sweeps, or one sided, provide proper heels. Provide proper scrap cutters to remove scrap. Never direct travel of piercing slugs toward operator. Slugs when jammed and released by piercing punch become a hazard.

When designing dies for double crank presses, be sure the overall dimension, right to left, of the punch holder, does not exceed the area of the ram. Most presses are built so that the ram slides, and gibs are much lower than the face of the ram when the stroke and adjustment are up. Serious consequences will result if this is disregarded.

Draw dies for toggle presses—provide ample clearance from face of ram extension to face of blank holder. At a certain position of the crankshaft cycle, the face of the ram exceeds the face of the blank holder.

NOTICE

We propose including in our Journal a classified column headed "HELP WANTED" and "POSITION WANTED".

This service is intended to provide the employer with skilled help in tool drafting, tool design, and tool engineering.

Rates will be 10c per line with 50c minimum charge for classified advertisements, and information will be kept confidential.

These columns will be extended, and a proper handling committee built up in the same measure as it is accepted and used by the society.

Sissy!

A man came into an Arkansas town, driving two mountain lions hitched to a small rig and using a live rattlesnake for a whip. He drove up to the town hitching post, hitched his team, struck the whip in his pocket and walked into the general store and asked for a drink. "How about a coke?" asked the store-keeper. "Nothing stronger?" queried the tough guy. "Got some corn likker," says the storekeeper. "Nothing stronger?" again asked the T. G. "Wal," drawled the Arkansawan, "I got some carbolic acid. You can take some sulphuric acid for a chaser," "Okay, pal. Lessee it," and Mr. Tough Guy downed three in the bat of an eyelash. "Stranger," asked the storekeeper, "where you from?" "West Texas," snapped the stranger. "Why'd you leave?" "Got run out," again snapped the stranger. "Why?" Here the Texan fumbled his hat a bit and looking sheepish, answered: "Aw, they said they didn't want any sissies out thar."

* * *

"Mother," said the motorman's son, "do they have street cars in heaven?"

"No, dear," replied the mother. "It requires motormen to run street cars."

* * *

Moth Dithagreeable.

There had been a burglary in the village. Next morning the town weekly came out with the following item:

Lath night thome thneaking thecoundrel thtole into our compothing room and pilfered the cabinetth of all the ehtheth! Therefore we would like to take advantage of of thith opportunity to apologize to our readerth for the general inthipid appearance of your paper. We would altho like to thtate that if at any time in the yearth to come we thould thee thith dirty thnake—in the grath about the premitheth, it will be our complete and thorough thatithfaction to thoot him full of holeth. Thank you!

* * *

A Bishop had been preaching with some feeling about the use of cosmetics by young girls.

"The more experience I have with lipstick," declared he, warmly, "the more distasteful I find it."

* * *

Susie Smart to work would wear
The very highest heels.
One day a top step caught her up.
For her the church bell peals.

APPLICATION FOR MEMBERSHIP

Article II - of the Constitution.

Section 1. - Membership in this Society shall be classified into two groups, - (1) Senior, and (2) Junior. In order to be admitted to Senior Membership, the applicant shall be either, (a) Tool Engineer, who is a man of recognized ability, to plan the order of operations, to layout, supervise the design and manufacture of tools and equipment; or (b) Tool, Die or Machine Designers having five years experience; or (c) an Executive possessing knowledge of tool engineering for mass production. Before a person may become a Senior Member, he must have attained the age of twenty-five years.

Section 2. - Any tool designer having less than five years experience or any student in a recognized school or college studying tool designing or tool engineering is eligible for Junior Membership.

FORMALITIES TOWARD MEMBERSHIP

BL-1. — All applicants for Senior or Junior Membership must set forth in the application for membership signatures of at least five members of the Society or if unable to obtain the signatures of members he may give as reference the names of non-members familiar with his work. The applicant shall set forth in the application, a complete resume of his qualifications for membership.

BL-2. — The Board of Directors may in its discretion authorize the organization of enrolled students of the Society as Student Branches at recognized institutions of tool engineering, for purposes which are in harmony with the object of the Society; such branches shall be governed by such rules and regulations as prescribed by the Directors from time to time.

If qualified and interested in joining the American Society of Tool Engineers, fill out this coupon and forward to the Secretary's office, 8316 Woodward Ave., Detroit, Mich.

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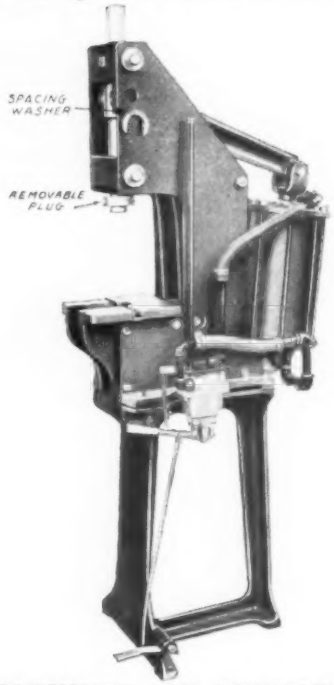

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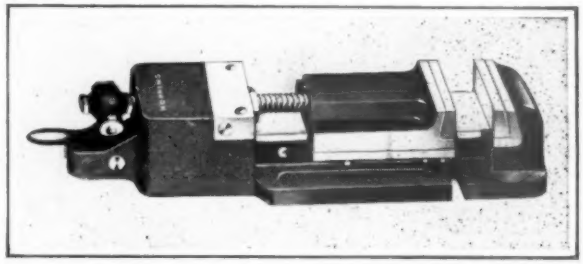

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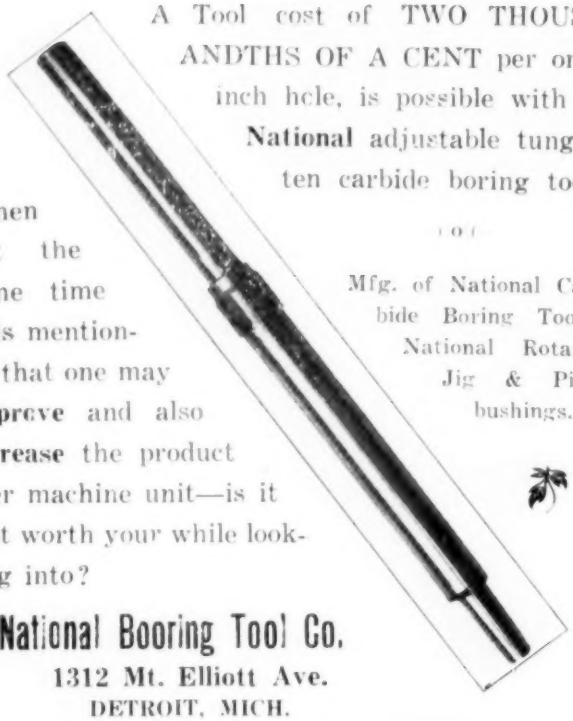

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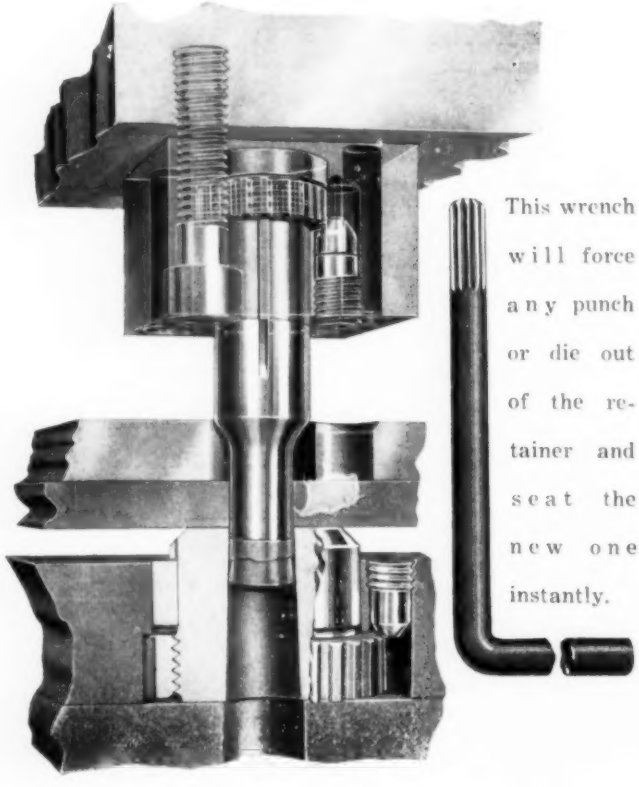

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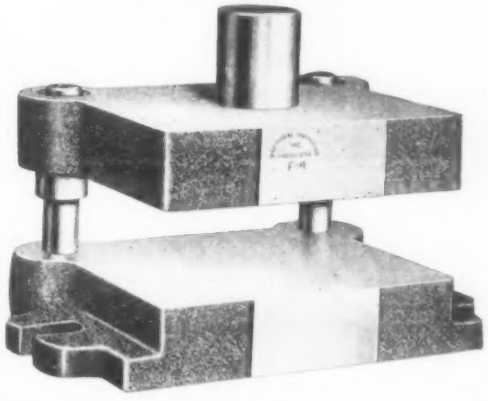

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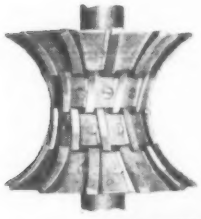

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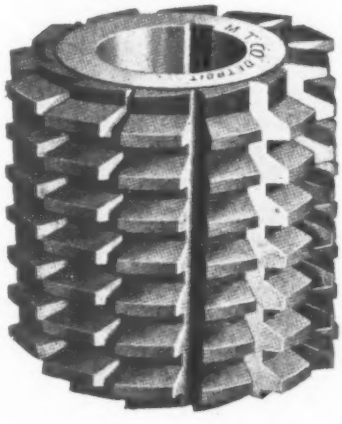

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